

Interactive comment on “Comment on “The origin of methane in the East Siberian Arctic Shelf unraveled with triple isotope analysis”, by Sapart et al. (2017)” by Katy J. Sparrow and John D. Kessler

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We thank Dr. John Pohlman (RC1) for his thorough review of our comment on the article by Sapart et al. (2017). Here we attempt to address his question that asks about what explanations there could be for the “ ^{14}C -enriched” samples being contaminated by collection/preparation procedures in both sediment and seawater samples (but not all samples) from separate land and sea expeditions.

To be clear, we are not arguing one way or the other as far as where the radiocarbon

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(14C) contamination came from, whether it was present in the environment or whether it was derived from sample collection and preparation equipment; instead, we state that we do not have enough information to rule out either scenario.

We re-emphasize here that the lack of a data table containing the specific triple-isotope information for each methane (CH₄) sample, in the article or in a data repository, has the effect of making this study unnecessarily opaque for a reader attempting to draw conclusions for themselves. Additionally, the scarcity of methods and absence of quality control data for the collection and preparation of the sediment and seawater 14C-CH₄ samples prevents readers from having knowledge of what specific commonalities and differences occur in those procedures.

To list some given information from the article that pertains to this topic: Sediment from directly offshore of Tiksi and seawater samples from the shelf edge due north of the Lena River delta were measured to be “14C-enriched”; there is no seawater data from directly offshore Tiksi and no sediment data from the shelf edge. The 14C-enriched sediment samples were collected from an equipment caravan driving from land onto the sea ice during a winter month of 2011 while the 14C-enriched seawater samples were collected from an unnamed ship during summer 2012. Data is presented for four sediment cores offshore of Tiksi, but only the ID-11 core shows the supermodern 14C-CH₄ and it appears from Figure 2 that the enrichment is found in all but two of the ca. 20 samples from that core. The 14C-CH₄ data for the other three sediment cores from that area (IID-13, IIID-13, and VD-13; collected later, in 2013 (?)), are not 14C-enriched above modern. However, for reasons unknown, unlike the ID-11 core, there is minimal (only two (?)) 14C-CH₄ data above ca. 20 m for those other three cores, while there is data presented above 20 m in those cores for the other analytes (CH₄ concentration and CH₄ stable isotopes). All of the presented 14C-CH₄ seawater samples that were collected from stations at the shelf edge are 14C-CH₄ enriched. We will end by noting that the range of 14C-CH₄ values for the 14C-enriched sediment and seawater is similar (100 to approaching 10,000 percent Modern Carbon).

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Extraneous ^{14}C - CH_4 contamination added by collection/preparation procedures can come from a host of vectors in the field and the laboratory and we will not attempt to make up scenarios for how the Sapart et al. samples could have been affected. However, an obvious vector is contact with materials and/or work space that have a (known or unknown) history of tracer work, a possibility that the procedural blanks we describe in our original comment help to exclude or identify.

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